MINNESOTA
PUBLIC UTILITIES COMMISSION

Staff Briefing Papers

Meeting Date	August 1, 2019		Agenda Item **1
Company	Minnesota Power (MP or the Company)		
Docket No.	**E015/M-12-233**		
	In the Matter of Minnesota Power's Compliance Report for its Temporary Rider for Residential Time-of-Day Rate for Participants of the Smart Grid Advanced Metering Infrastructure Pilot Project		
Issues	Should the Commission accept MP's compliance report as complete?		
	Should the Commission direct MP to file a new Time of Day Rate?		
Staff	Sean Stalpes	sean.stalpes@state.mn.us	651-201-2252

✓ **Relevant Documents** — **Date**

Commission Order Accepting MP Report	August 20, 2018
Minnesota Power, Compliance Report	February 20, 2019

To request this document in another format such as large print or audio, call 651.296.0406 (voice). Persons with a hearing or speech impairment may call using their preferred Telecommunications Relay Service or email consumer.puc@state.mn.us for assistance.

The attached materials are work papers of the Commission Staff. They are intended for use by the Public Utilities Commission and are based upon information already in the record unless noted otherwise.

I. Summary of the Issues

The issues before the Commission include whether to accept MP's compliance report as complete and what procedural guidance the Commission could give MP and parties, if any, on further development of the Company's ongoing alternative rate design.

Both issues will be discussed extensively throughout these briefing papers; however, it might be helpful to note here that there is not *necessarily* a requirement that the Commission take any action at all. Having said that, this docket has been a long and winding road consisting of pilot evaluations, rate modifications, numerous compliance reports, and several Commission orders nudging the Company toward alternative TOD rate designs that can replace the current TOD pilot rate and, perhaps, be offered on a system-wide basis to residential customers.

With this in mind, staff believes Commission action on the completeness of MP's instant compliance report is warranted, if not only to memorialize the Commission's assessment of the report for the record, and this would be consistent with what the Commission has done in the past. The second part—guidance on further development of MP's TOD rate—is less necessary, although past Commission orders have directed the Company through the alternative rate design process, which is parallel to its TOD pilot, via compliance reporting and stakeholder engagement. Therefore, while addressing the procedural aspects of alternative rate design is entirely up to the Commission, ongoing guidance could be helpful. One reason is because the outcome of the stakeholder process on alternative rate design, while apparently productive, has left stakeholders and the Company at an impasse to some degree on how aggressively to pursue TOD rates and the specifics of the rate itself.

II. Background

Rate Design History

The instant docket dates back to March 20, 2012, when MP first filed its *Petition for Approval of a Temporary Rider for Residential Time-of-Day Rate for Participants of the Smart Grid Advanced Metering Infrastructure Pilot Project*. At the time, MP initiated a time-of-day (TOD) pilot program as part of a broader smart grid/advanced metering infrastructure (AMI) project partially funded through a U.S. Department of Energy (DOE) grant.[1]

On November 30, 2012, the Commission approved the Company's temporary rider with several conditions. Among those conditions was the Commission's requirement that the rate be revenue neutral; ordering paragraph 7 of the Commission's Order, excerpted below, addresses revenue neutrality and annual compliance reporting:

> 7. Require Minnesota Power to submit reports annually beginning one year from start of the program reflecting Minnesota Power's analysis, including information

[1] The project was funded in part by the 2009 American Recovery and Reinvestment Act (ARRA). MP was awarded $1.5 million in ARRA funds, and the project cost was estimated to cost about $3 million.

on customer participation, usage levels, narratives, and bill impacts under the rider.

Minnesota Power must identify any under/over recoveries in its annual reports and adjust the Time of Day Rate to ensure revenue neutrality.

The TOD rate pilot is unique for Minnesota in that it includes an off-peak and on-peak rate with a critical peak pricing (CPP) component, which no other Minnesota utility has. A CPP rate allows for a utility to "call" events during system emergencies or times when wholesale market prices are unusually high. The concept of CPP events is that customers are exposed to a very high price for a short period of time (generally a few hours per year), and in return, the off-peak prices where they can shift their energy consumption can be much lower than the price would otherwise be at those low system demand hours. In MP's case, customers are charged an additional 77 cents per kilowatt-hour (kWh) during CPP events, but they have the option to shift their load to an off-peak period at a discounted price.

The initial rate design allowed MP to call a maximum of 160 CPP hours per calendar year, but for rate calculation purposes, MP assumed it would only call 100 CPP hours. (Given the magnitude of a 77 cent/kWh adder, the assumption for the number of CPP hours called will significantly affect the price at which to set prices for on-peak and off-peak rates.) As shown by the table below, for the initial rate structure, which covered the October 2015 - April 2017 timeframe, a 77 cent/kWh CPP rate resulted in an on-peak adder of about 1.4 cents/kWh and an off-peak discount of about 3 cents/kWh. Note that MP uses the adder/discount structure in order to accommodate the inverted block rate structure of the current residential tariff rate.

Initial Rate Structure Action Usage Period October 2015 - April 2017	
On-Peak Hours	08:00 – 22:00 Monday - Friday
Off-Peak Hours	All other hours & designated holidays
Summer CPP Hours	12:00 - 15:00
Winter CPP Hours	17:00 - 20:00
On-Peak Increase	$0.01415
Off-Peak Discount	-$0.0299
CPP Event Increase	$0.77

In MP's March 25, 2016 compliance report, the Company explained that it ultimately called far fewer CPP hours in the first year—only 18 hours—than originally assumed. As a result, to cover the revenue deficiency, MP requested the Commission approve a rate adjustment that would (a) assume just 25 CPP hours (instead of 100) and (b) adjust the on-peak adder to 4.87 cents per kWh (instead of 1.415 cents per kWh), which was a more than three-fold increase to the on-peak adder. (Note that while the 25 CPP hours were assumed for rate calculation purposes, the program allowed MP to call up to 50 CPP hours.)

Exploring Alternative Rate Design

On February 15, 2017, the Commission approved MP's requested increase to the on-peak adder, which became effective on May 1, 2017. However, concerned about the impact the rate increase could have on participation in the pilot, and seeing the writing on the wall that MP would need to explore alternative rate designs for a system-wide TOD rollout, the Commission essentially bifurcated the reporting process. One track would focus on continued monitoring of the current pilot, including participation rates, customer feedback, and so forth. The second track, which is the subject of MP's February 20, 2019 compliance report before the Commission at this time, would examine alternative rate designs that could replace the current TOD rate and potentially be offered to more residential customers.

Because the Commission was concerned about the immediate impact of the rate increase, it required MP to submit compliance reports due 6 months and 12 months following the May 1, 2017 rate increase. The 6-month report would update the Commission on pilot participation, and MP was given 12 months to develop new TOD rate options to present to the Commission.

As expected, the 6-month (November 2017) report revealed that a number of customers opted-out of the pilot, with participation dropping from 539 participants to 453 participants,[2] about 16% of participants, from April 2017 - November 2017, or the time MP notified customers of the rate increase until the required filing date of the November report:

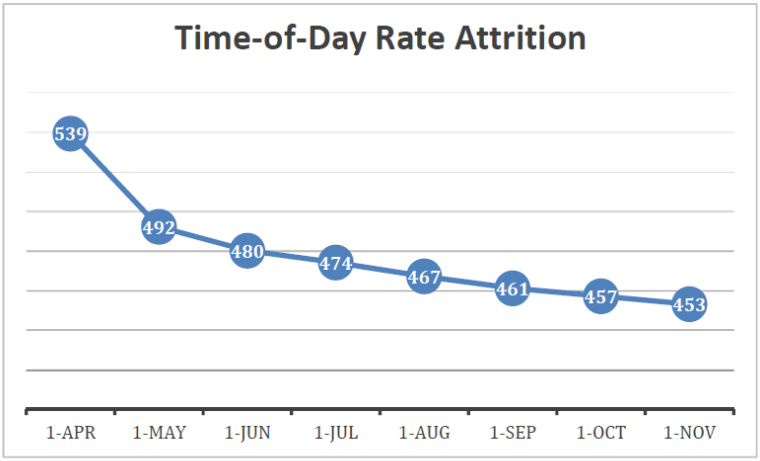


Figure 3: TOD Rate Attrition

In the November 2017 report, MP also requested an extension to file the 12-month, May 2018 report on alternative rate design until September 1, 2018.

In its February 13, 2018 Order, the Commission accepted the 6-month report as complete and granted MP's requested extension. However, because the Commission wanted to stay apprised of pilot participation and receive a full calendar year of CPP event data, the Commission still required MP to file a report on the TOD pilot by May 1, 2018.

Ending/Closing the TOD Pilot

[2] The program began with about 660 participants. Customers could opt-out after being on the rate for at least 12 months.

MP's May 1, 2018 compliance report was significant for a number of reasons:

- First, it showed continued attrition since the November 2017 report, with participation declining from 453 customers in November 2017 to 425 customers in May 2018.

- Second, having a full calendar year of CPP event data was illuminating because MP almost reached its 50-hour CPP cap, calling 48 CPP hours between May 2017 and February 2018.

- Third, whereas in the 2016-2017 year, the CPP hours were mostly in the summer, most CPP hours for 2017-2018 occurred in the winter. In fact, eight consecutive days of CPP events were called from December 29, 2017 through January 5, 2018, which, according to the customer feedback survey, contributed to an overall dissatisfaction with the CPP component of the pilot.

- Fourth, MP actually over-collected revenues because it went above its assumed 25 CPP hours and called 48 CPP hours (the cap was set at 50 hours).

For these reasons, MP requested (a) discontinuing the TOD pilot altogether or (b) removing the CPP component and either increase the on-peak adder or decrease the off-peak discount. In addition, MP requested that it no longer be required to submit formal customer surveys.

In its August 20, 2018 Order, the Commission declined MP's request to discontinue the rate or remove the CPP component, but it granted MP's request to discontinue formal evaluation of the pilot. The Commission also delayed the alternative rate design filing until February 2019 to allow more time for the stakeholder process.

Reporting Requirements

So that the Commission is clear, MP's February 20, 2019 compliance report is *not* an update on the TOD pilot; rather, it is the second track of the bifurcated reporting process, the Company's aforementioned 12-month alternative rate design report required by the Commission February 15, 2017 Order. As discussed above, the 12-month report was originally due in February 2018, but MP requested an extension in its November 2017 report, and the Commission postponed the deadline as part of its August 20, 2018 Order.

As required, MP filed its compliance report on alternative rate design on February 20, 2019. At this stage of the process, the Commission is simply being asked to approve the Company's alternative rate design report.

III. MP's Compliance Report

A. Current TOD Rate

As discussed previously, MP has offered its current TOD Rate as a pilot program since 2014. The current rate structure is depicted in the table below. Notably, MP's on-peak period is 14 hours, from 8 a.m. to 10:00 p.m. on non-holiday weekdays, and during these hours there is an approximately 4.9 cents/kWh adder to the customer's energy charge. Also, the 77 cent/kWh CPP adder has remained unchanged throughout the pilot:

Current Rate Structure May 2017 - Present	
On-Peak Hours	08:00 - 22:00 Monday - Friday
Off-Peak Hours	All other hours & designated Holidays
Summer CPP Hours	12:00 - 15:00
Winter CPP Hours	17:00 - 20:00
On-Peak Increase	$0.0487
Off-Peak Discount	-$0.0299
CPP Event Increase	$0.77

MP did not discuss the pilot extensively in its February 20, 2019 compliance report—recall that the pilot is now on a separate reporting track than alternative rate design—but it noted there are 394 customers remaining on the pilot.

The Commission's August 2018 order discontinued formal evaluation of the pilot, so there will be no customer feedback survey accompanying a future compliance report; however, one can infer that since there is an opt-out option, the fact that most initial participants remain is an indicator that there is a somewhat favorable view of the rate among pilot participants.

In its compliance report, MP presents the Commission with three different options for alternative rate designs. However, MP emphasizes that these rates cannot practicably be offered for a few years—that is, until the complete deployment of its AMI/MDM (advanced metering infrastructure/meter data management) is in place. In the meantime, MP plans to continue its current TOD pilot under the existing rate structure. (Staff notes that the TOD pilot is a "closed" pilot, which means it is not available to new customers.)

B. Summary of Options 1, 2, and 3

Stakeholder Comments

The compliance report relayed some general feedback from the stakeholder group with regard to how the rate could be improved for a future program offering. For example, MP explained:

> When compared with the Company's existing TOD Rate, stakeholders liked the shorter, more targeted, peak periods which they felt would better enable customer load shifting response. They also felt excluding the Critical Peak Pricing

> Events made the options simpler, and therefore more favorable, than the current pilot Rate.[3]

The stakeholder group also established two agreed-upon objectives and six "must have" principles as a baseline for the alternative rate design analysis.

Objectives:

> 1) Reduce system costs, including consideration of peak demand, the need for future investments in the system, and other costs (e.g. market costs).
>
> 2) Increase customer participation and satisfaction, with participation loosely defined as the number of customers actively reducing their on-peak load, and satisfaction based partly on the opportunity to reduce costs.

"Must Have" Design Principles:

> 1) Provide an evaluation of the costs and the benefits of the TOD program.
>
> 2) Include considerations for indemnifying low-income customers.
>
> 3) Enable energy conservation, cost-effective integration of additional renewables, and reduction of greenhouse gas emissions.
>
> 4) Provide rates that accurately reflect the costs of energy cost to serve, both now and looking forward.
>
> 5) Consider using an opt-out approach for the base TOD rate.
>
> 6) Give customers adequate tools to access and understand their usage data.

Alternative Rate Design Analysis

In its compliance report, MP presented three TOD rate design alternatives, which it refers to as Option 1, Option 2, and Option 3.

Importantly, MP emphasized that "no conclusive stakeholder consensus was reached in terms of a preferred rate design."[4] Equally important, no consensus was reached on whether a time-varying rate ultimately makes sense for MP's system.

With regard to the design of the three options, all have the same three tiers—peak, off-peak, and super off-peak. Super off-peak prices apply from 11 PM to 5 AM year-round. The on-peak

[3] Compliance report, at 21.

[4] Compliance report, at 2.

periods differ significantly among the three options. Off-peak periods are simply all remaining hours not included in the on-peak and super off-peak periods.

The average rates in the off-peak and super off-peak tiers are the same across all options. Thus, the differences exist in the average prices for each on-peak period and in the months and times that the on-peak periods apply. The average prices (in cents/kWh) for the three options are shown in the table below:

Preferred TOD Rate Design Options – Average Prices (cents/kWh):

	Option 1	Option 2	Option 3
Peak	16.8	13.8	14.9
Off-Peak	9.2	9.2	9.2
Super off-peak	6.7	6.7	6.7

As stated previously, the adder/discount structure is used to accommodate MP's existing inverted block rates for residential customers.[5] Below is table showing the same average rates as the table above, but presented as both the average rates and the amount of the adder/discount for each option. Note that the difference between the average rates and the adders in 9.6 cents/kWh, which is the monthly residential rate in the 401-800 kWh block:

	Option 1		Option 2		Option 3	
	Ave. Rates	Adders to Existing Rates	Ave. Rates	Adders to Existing Rates	Ave. Rates	Adders to Existing Rates
Peak	16.8	7.2	13.8	4.3	14.9	5.3
Off-Peak	9.2	-0.4	9.2	-0.3	9.2	-0.2
Super off-peak	6.7	-2.9	6.7	-2.9	6.7	-2.9

MP acknowledged that the three options do not exhibit as large of a price differential between the peak and super off-peak prices as TOD rates offered by many other utilities. However, the Company gave three reasons why a lower price differential makes sense for MP:

1. MP's system has a very high load factor with little seasonal or hourly load variability;

2. Unlike the summer-peaking MISO system, MP's system is winter-peaking. The times of highest MISO energy prices and capacity requirements do not coincide with times of highest demand on the Company's system; and

[5] The inverted block rate (IBR) structure was also a topic for discussion in the stakeholder group. According to MP, multiple stakeholders were interested to know how a TOD rate would impact the existing IBR, including whether the IBR would discontinue in favor of a new TOD rate.

3. MP's monthly service charge is not sufficient to recover all customer-related costs. Some of these customer-related costs must therefore be recovered through TOD rates, which increases the rates in all periods, thereby reducing the relative differential.

C. Customer Bill Impacts

The compliance report includes a preliminary estimate of how the three preferred rate options might affect customers' bills. The bill impact analysis began by estimating customer usage patterns, which was derived from a sample of hourly AMI energy use data from LIHEAP (Low-Income Home Energy Assistance Program) and non-LIHEAP residential customers. The data sample covered a one-year historical period.

The customer usage information in Table 9 below shows how similarly LIHEAP and non-LIHEAP customers use energy; under any of the three TOD rate options, the share of energy usage during the on, off, and super-off peak periods are nearly identical:

Table 9: Customer Usage

	Option 1		Option 2		Option 3	
Peak Period	Non-LIHEAP	LIHEAP	Non-LIHEAP	LIHEAP	Non-LIHEAP	LIHEAP
On	13.9%	14.4%	17.3%	17.7%	10.5%	10.7%
Off	66.8%	66.1%	63.4%	62.7%	70.1%	69.8%
Super-Off	19.3%	19.5%	19.3%	19.5%	19.3%	19.5%

Figure 16 below shows MP's bill impact analysis results for Option 3.[6] The customers analyzed were grouped into four categories: standard residential, electric heating, standard LIHEAP (nonelectric-heat), and LIHEAP with electric heat:

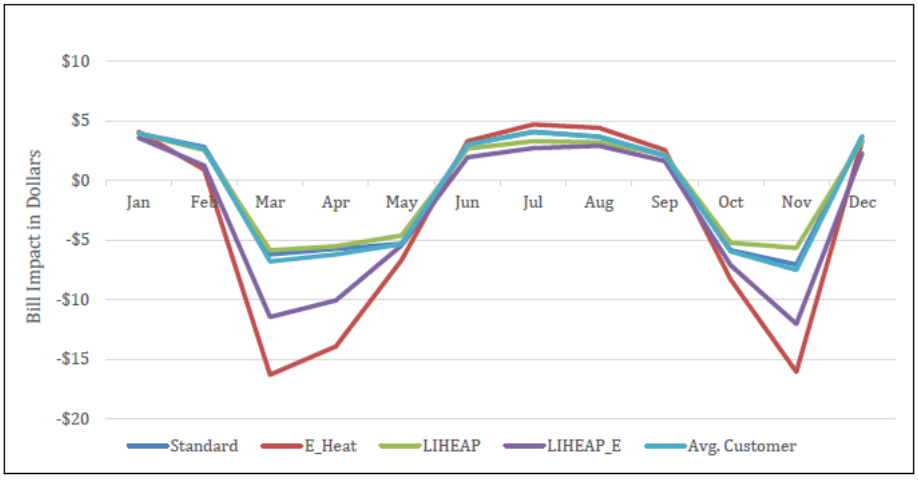


Figure 16: Bill Impacts by Customer

[6] Recall that Option 3 has peak periods of 5-9 PM weekdays in November - April *and* June - September, as well as a peak period of 2-6 PM on weekdays in May - October.

Some findings from the bill impact analysis revealed the following bill impacts over the October 2017 to September 2018 period:[7]

- A standard (non-electric-heat) LIHEAP customer would have saved between $2.5 and $8;
- An electric-heat LIHEAP customer would have saved between $16 and $28.5;
- A standard, non-heating, non-LIHEAP customer would pay between $0.5 and $5 more; and
- A non-LIHEAP electric-heat customer would save between $29 and $41 per year.

D. Daily Load Profiles and Hourly System Costs

In developing its alternative rate designs, MP began by taking a cost causation approach:

> A core principle of any rate design is to ensure the rates being charged to customers reflect cost causation. When developing a TOD rate, a methodology should be utilized to align prices charged during each TOD period with the costs incurred during the same period.[8]

The TOD rates—Options 1, 2, and 3—were directly derived from the hourly variable costs of serving system demand. To calculate the hourly cost of serving peak demand, Navigant Consulting, who MP retained to assist in designing the rate, developed a "cost duration method," which assigns a share of costs to each hour in a way that reflects actual usage. (Note that residential peak demand is 273 MW, and MP's system peak demand is about 1,700 MW.)

This process started with the annual costs to serve residential customers, which were taken from MP's electric class cost-of-service study submitted in the Company's 2016 rate case.[9] Table 1 shows the approved annual revenue requirement allocated to the residential customer class, broken down into capacity, energy, and customer classification. Table 1 also identifies the approach used to allocate each cost classification across the hours of a year.[10]

[7] Compliance report, at 29.

[8] Compliance report, at 20.

[9] Docket No. 16-664.

[10] Compliance report, at 13.

Table 1: Revenue Requirements[5]

Classification	Hourly Cost Allocation	Annual Cost
Capacity	Cost Duration Method	$47m
Energy	Locational Marginal Prices	$31m
Customer	Evenly Allocated	$27m
Total Revenue Requirement		$105m

To convert the annual revenue requirement into an hourly cost to meet demand, MP allocated annual dollars to each hour during the year. The $31 million in annual energy costs shown in the table above were allocated to each hour based on the hourly locational marginal price (LMP) at the MISO MP node. The $47 million in capacity costs were broken down at the functional level—generation, transmission, and distribution—as shown by the table below:[11]

Function	Annual Cost
Generation	$21m
Transmission	$7m
Distribution	$19m
Total Capacity Cost	**$47m**

For a detailed discussion of the cost duration method used to calculate these functional capacity costs into an hourly residential customer cost, staff refers the Commission to MP's report. In short, MP took the following steps, which were separately applied to the generation, transmission, and distribution costs in order to calculate the unit cost of each hour:[12]

1. Capacity costs were divided by the peak load of each load duration curve[13] to find a unit cost per MW of capacity.

2. Calculate the incremental load in each hour by taking the difference in load between that hour and the hour with the next highest load.

3. For each hour, the incremental load is shared evenly between the hour in question and all hours of the year that have a higher load than the hour in question.

4. The load allocated to each hour is then totaled.

5. The load allocated to each hour in Step 4 is multiplied by the unit cost calculated in Step 1 to calculate the total cost of each hour. This can in turn be divided by the billing load in that hour to calculate the unit cost of each hour.

[11] Compliance report, at 16.

[12] Compliance report, at 16-17.

[13] Specific load duration curves were used to allocate costs across the hours of the year. The MISO LRZ1 load duration curve was used to allocate generation capacity costs. MP's system load duration curve was used to allocate transmission capacity costs. MP's residential load duration curve was used to allocate distribution capacity costs.

The total variable cost of serving residential demand in each hour of the year is therefore derived by combining hourly energy costs with the results of the cost duration method outlined above for capacity costs. Once the TOD time periods are selected (the process and details of which are discussed below), the weighted average of the costs of each hour within each TOD period is then calculated. The billing unit (i.e. residential kWh) associated with each hour is used to weight the hourly costs, so higher load hours are weighted more heavily than lower load hours.

Time-of-Day Periods

While adhering to its core principle that TOD rates should reflect cost causation, MP noted, "selecting TOD periods requires balancing a number of different goals such as simplicity for customers (and the utility) and desired size of price differentials between time periods."[14] MP further explained that the TOD periods were reviewed and refined through the stakeholder process.

Based on this stakeholder feedback, MP produced three preferred TOD rate design alternatives with different time periods for the peak, off-peak, and super off-peak times. Peak periods apply on non-holiday weekdays only, super off-peak prices apply overnight throughout the year, and off-peak periods are all remaining years.

The table below provides the TOD period for Options 1, 2, and 3:

Final Rate Design Options – Time Periods:

	Option 1	Option 2	Option 3
Peak	3:00 PM – 8:00 PM weekdays in Dec – Feb and June – Sept	3:00 PM – 8:00 PM weekdays	5:00 PM – 9:00 PM weekdays in Nov – Apr and June – Sept 2:00 PM – 6:00 PM weekdays in May – Oct
Off-Peak	All other times	All other times	All other times
Super off-peak	11:00 PM – 5:00 AM	11:00 PM – 5:00 AM	11:00 PM – 5:00 AM

Presented another way, MP showed the three options using a color scheme where:

- Red = peak;
- Yellow = off-peak; and
- Green = super off-peak

[14] Compliance report, at 20.

Option 1
(Peak: 3-8 PM weekdays in Dec-Feb and June-Sept)

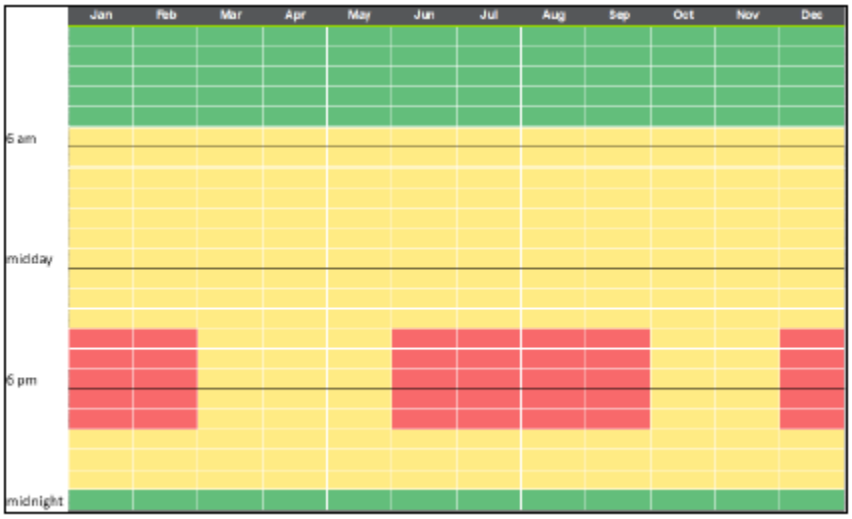


Figure 13: Option 1 Time Periods (red = peak, yellow = off-peak, green = super off-peak)

Option 2
(Peak: 3-8 PM weekdays for 12 months)

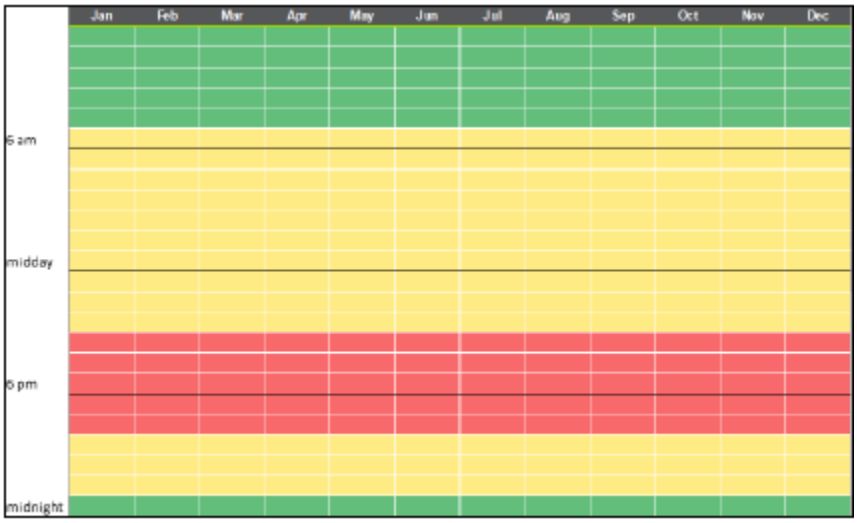


Figure 14: Option 2 Time Periods (red = peak, yellow = off-peak, green = super off-peak)

Option 3
(Peak: 5-9 PM weekdays in Nov-Apr and June-Sept, 2-6 PM weekdays in May-Oct)

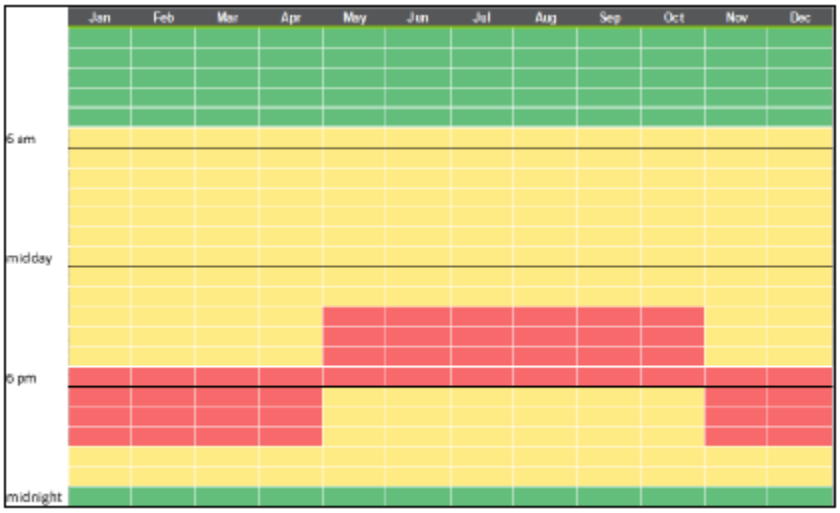


Figure 15: Option 3 Time Periods (red = peak, yellow = off-peak, green = super off-peak)

Figure 12 of the compliance report, shown below, is a representation of the hourly cost of serving residential load (in cents/kWh), with darker green colors indicating a low cost to serve residential load and darker red colors indicating high costs to serve residential load:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.6	5.6	5.3	5.1	5.5	5.7	5.2	5.4	5.0	5.3	5.5	5.5
	5.4	5.5	5.2	5.1	5.5	5.8	5.2	5.4	5.0	5.4	5.4	5.4
	5.3	5.4	5.2	5.1	5.5	5.8	5.1	5.4	5.0	5.4	5.4	5.3
	5.2	5.4	5.2	5.1	5.7	5.8	5.2	5.4	5.1	5.5	5.4	5.2
	5.3	5.4	5.4	5.6	5.9	5.9	5.2	5.5	5.4	5.9	5.6	5.3
6am	5.9	6.0	6.2	6.3	6.2	6.2	5.4	5.7	5.7	6.6	6.0	5.7
	7.4	6.9	7.1	6.7	6.5	6.5	5.8	6.1	6.2	6.6	6.5	6.7
	8.2	7.5	7.5	6.8	6.7	6.7	6.3	6.4	6.4	6.8	6.8	7.5
	8.9	7.9	7.6	7.0	6.9	7.1	6.9	6.7	6.7	6.9	7.1	7.9
	8.8	7.8	7.6	6.9	7.0	7.4	7.6	7.0	7.0	7.0	7.1	8.5
	9.3	7.5	7.4	6.7	7.0	7.8	8.6	7.4	7.1	6.9	7.0	8.1
midday	8.5	7.4	7.1	6.5	6.9	8.2	9.9	7.9	7.3	6.8	6.9	8.0
	8.0	7.1	6.8	6.5	6.9	8.7	12.0	8.5	7.6	6.8	6.7	7.9
	7.4	6.8	6.6	6.4	7.0	9.3	15.3	9.4	8.2	6.8	6.6	7.5
	7.1	6.6	6.4	6.3	7.0	9.8	19.0	10.1	8.7	6.8	6.5	7.1
	7.4	6.5	6.4	6.2	6.9	10.2	21.7	10.1	8.8	6.7	6.4	7.4
	9.9	6.9	6.4	5.9	6.6	9.9	25.8	9.5	8.7	6.6	7.5	11.2
6pm	17.3	8.9	7.1	5.8	6.3	9.4	24.7	9.0	8.3	7.4	8.9	33.0
	17.9	9.1	8.1	6.6	6.4	8.7	18.4	8.3	7.9	7.1	8.5	29.9
	15.6	9.0	8.3	6.7	6.6	8.2	14.0	7.9	7.3	6.4	7.8	17.8
	10.5	7.8	7.4	5.9	6.1	7.5	10.3	7.2	6.8	5.9	6.9	12.4
	8.2	6.8	6.4	5.3	5.7	6.7	7.9	6.3	5.9	5.6	6.3	9.4
	6.5	6.2	5.5	5.1	5.5	6.2	6.1	5.7	5.1	5.3	5.9	6.9
midnight	5.9	5.8	5.2	5.0	5.4	5.8	5.4	5.5	4.9	5.3	5.6	5.8

Figure 12: Hourly Variable Cost by Month of Serving Residential Load (c/kWh

By simply comparing the colors in Figure 12 (hourly variable cost by month) to Figures 13-15, which display on-peak, off-peak and super-off-peak by color, it appears that Option 1 most closely resembles the hourly variable cost data shown below. However, Figure 12 generally

aligns with all three options to some extent. Overall, the data show that the highest cost hours (shaded red) occur in two distinct periods:

- Winter evenings, particularly in December and January, and
- Summer afternoons, particularly in July.

According to MP, "[t]he three-period structure allows the Company to target both high-cost and low-cost time periods, which is not possible under a two-period structure that can typically target only one or the other."[15] Again, while there was no consensus favorite, MP noted that stakeholders generally preferred shorter on-peak periods that enable realistic load shifting.[16] Stakeholders also suggested MP look at ways to reduce the super off-peak price, potentially by shortening the length of the super off-peak time period.

E. AMI and MDM Infrastructure

MP has reported an AMI implementation rate of about 6-8% per year (roughly 10,000 meters) for several consecutive reports. At present, over 50% of MP's meters are AMI. Also, several consecutive reports have noted that MP expects to be at full AMI deployment by 2025, and that expectation remains unchanged. MP noted, however, that the 100% AMI by 2025 schedule "could be accelerated if availability of resources (both workforce and funding) are increased."[17]

In its May 1, 2018 compliance report, MP addressed the need for a meter data management (MDM) solution to accommodate a system-wide rollout of a TOD rate. MP emphasized that its planned MDM implementation and integration "is a strategic investment for the Company and the continued progress of the MDM system integration does not hinge on the approval or disapproval of a current or future TOD rate."[18] In other words, MP would be investing in MDM regardless of TOD rates.

The compliance report includes a through discussion of its planned MDM system, but MP also included in Attachment A a presentation MP gave to the stakeholder workgroup on AMI/MDM, which provides a good summary of the benefits and capability of the technology. Below, staff shows three slides showing (a) the need for MDM, (b) the benefits of MDM, and (c) a timeline for implementation.

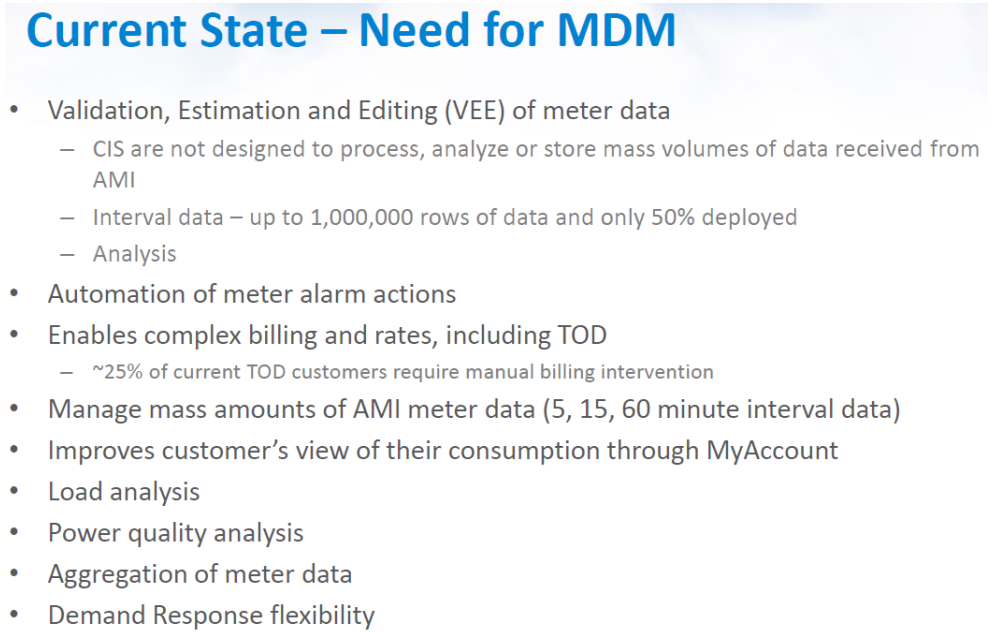
As shown in the first of the included slides, MDM will allow MP to, among other things, aggregate large amounts of data, improve load and power quality analysis, and allow MP to efficiently change the time periods of a TOD rate:

[15] Compliance report, at 21.

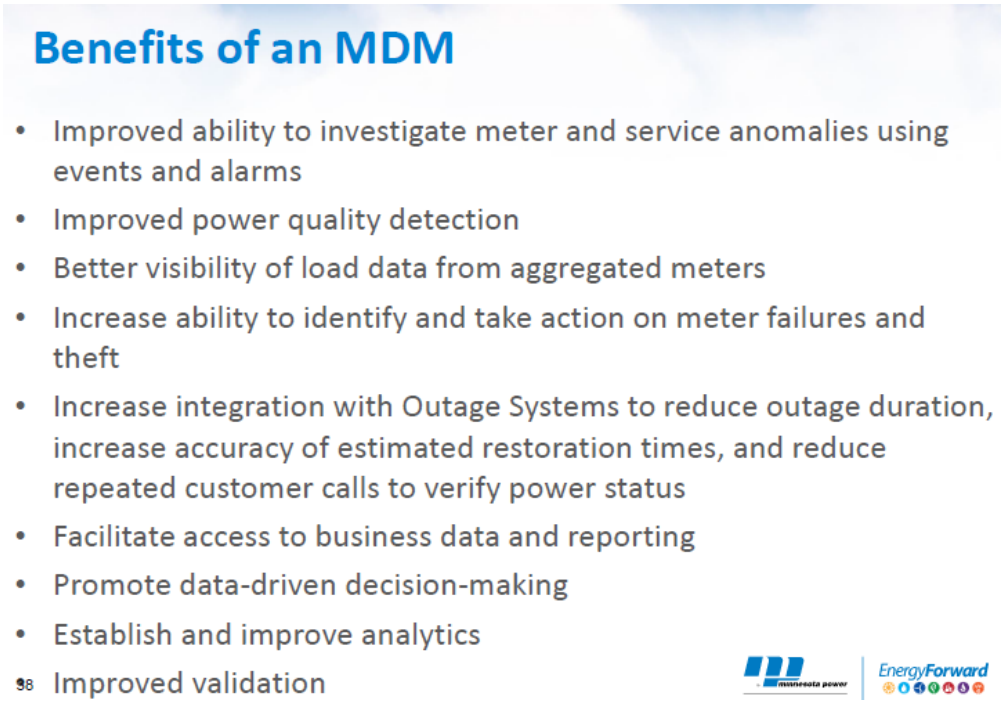
[16] Compliance report, at 21.

[17] Compliance report, at 6.

[18] Compliance report, at 6.



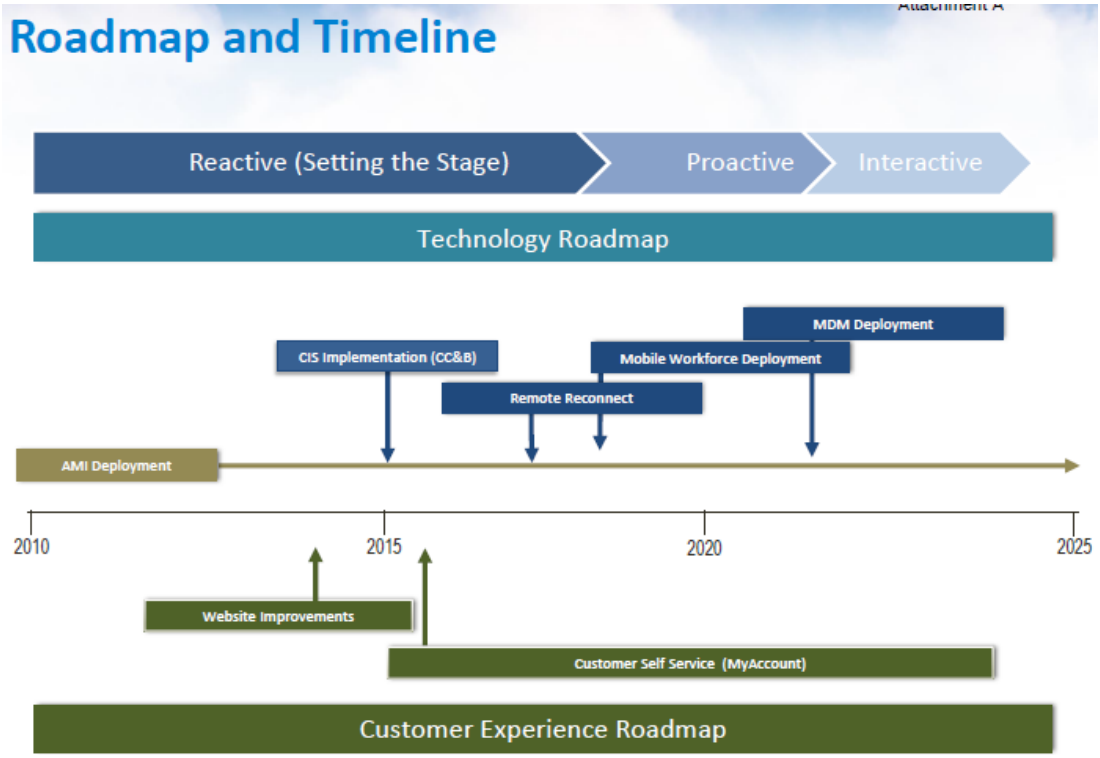
According to MP, its MDM infrastructure will provide benefits far beyond just enabling TOD rates. Such benefits include:



MP completed a request for proposal (RFP) process and MDM selection in late 2018.[19] It will next select a System Integrator (SI) to assist with the design, build, testing, and implementation of the MDM. According to MP "the Company currently has an RFP process underway and

[19] MP selected the Oracle Customer-to- Meter Solution (Oracle C2M) in November 2018.

anticipates SI selection in 3rd quarter of 2019."[20] Several other steps are required before MDM deployment, which involve both a "Technology Roadmap" and a "Customer Experience Roadmap":



The timeline for a full-scale TOD rate rollout is heavily dependent on MP's planned MDM implementation and integration. Even with the complete deployment of AMI, MP stated that "in all practicality, an MDM solution needs to be in place systemically before a system-wide rollout of this type of rate/program."[21]

IV. Parties' Comments

For this round of compliance reporting, no party filed comments within the 30-day comment period set by rule. This may be because:

- MP held a stakeholder process, the alternative rate designs presented in the compliance report are based on stakeholder input, and MP included several documents from the stakeholder process as attachments to its compliance report; thus, staff believes stakeholder comments are fairly well-represented already.

- MP noted in the compliance report that consensus was not reached on either the preferred rate design or the procedural path forward, so guidance from the Commission

[20] Compliance report, at 7.

[21] Compliance report, at 7.

could be the most efficient way to move MP's alternative rate design forward at this time.

- Unlike past reports, MP did not request any rate modification for the Commission to approve, so the only issue parties could comment on (other than procedure) is whether MP's compliance report is complete.

Even though the Commission did not receive comments, there is obviously significant interest in alternative rate design. If the Commission wishes to hear from parties who have already appeared in prior instances for this docket, it could ask these parties (if they are in attendance) at the Commission hearing.

During the last round of this proceeding, the Department of Commerce, the Citizens Utility Board of Minnesota, Fresh Energy, and the Office of Attorney General all filed comments. (This was unique, as only MP and the Department have filed regular comments since the pilot was approved in November 2012.) MP noted in its compliance report that "[r]epresentatives from Citizens Utility Board, Fresh Energy, Department of Commerce, and the Office of the Attorney General were able to attend all or most meetings either in person or via phone or webinar,"[22] so the parties have been involved with MP in the discussion of the three rate design options.

V. Staff Analysis

The first issue and the only required matter for the Commission's consideration is whether to accept MP's compliance report as complete. In staff's view, the report is clearly complete; it is very thorough and addresses all of the Commission's requirements from its August 20, 2018 Order. Moreover, the report provides a number of key insights that allow the Commission to make an informed decision on any procedural avenue it wishes to take, whether that be a new docket for a phased-in or system-wide TOD rate, or further development of Options 1, 2, and/or 3 in this docket.[23]

The second issue is what the Commission should do, if anything, with the three rate design alternatives presented in the report. As a preliminary matter, it's worth noting that, for compliance reporting purposes, the process is still divided into two separate, albeit not mutually exclusive, tracks—the current TOD pilot and alternative rate design. There are two final informational reports on the TOD rate pilot scheduled to be filed in August 2019 and August 2020, which is why MP's February 20, 2019 compliance report is so light on discussion of the TOD pilot.[24]

---

[22] Compliance report, at 4.

[23] Staff notes that the Commission does not have to take any action on this issue, as the compliance report is more of an informational filing, and it does not request any rate modifications; however, it has been past practice to address completeness.

[24] The Commission's August 20, 2018 Order required: "Beginning one year from the date of this [the August 20, 2018] order, and for a period of two years, Minnesota Power shall submit annual informational filings providing a summary of the time-of-day pilot program, including participation rates, an update on Minnesota Power's meter communications infrastructure, and the Company's plans to offer a system-wide rollout of residential time-of-day

While not mandatory, the Commission could give general guidance on the timing of a phased-in or system-wide TOD rollout, as well as how to manage that procedurally. One option would be to require MP to file an actual proposal in a new docket that builds on the findings of the stakeholder process. The justification for opening a new docket would be that alternative rate design would be clearly separated from the instant docket, which is seven years old and specific to a TOD pilot that is now closed to new customers and has declining participation. However, while it might appear a new docket would have the most clearly defined scope, for reasons that will be explained below, staff believes it might be premature to open a new docket for alternative rate design.

As noted previously, stakeholders did not reach consensus on rate implementation, and MP emphasized that a TOD rollout of any scale is heavily dependent on its MDM implementation, which as shown by Figure 17 below, will not be finished for another two years at the earliest (staff added the red arrow to emphasize the 2021 MDM Implementation and possible TOD Tariff filing date). In addition, a system-wide TOD rollout, according to the Company, might not be possible until 2025. Thus, what a new docket will be accomplish in the near-term is very limited.

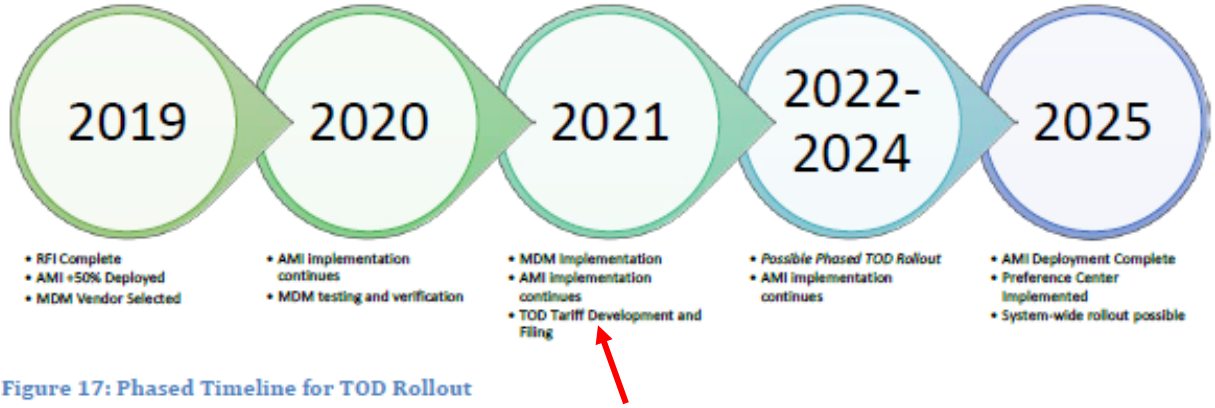


Figure 17: Phased Timeline for TOD Rollout

The procedural challenge is providing a path for an eventual TOD rollout in a way that ensures the process the Commission initiated does not end and go away, but which acknowledges MP's concerns with getting in place its required infrastructure. In charting a course forward, the Commission may consider the following factors, which have already been discussed to some extent:

- The fact that a phased-in TOD rate is possible in 2022-2024, even if a system-wide rollout of TOD rates is not possible until 2025, means that an actual TOD tariff rate could be filed as soon as 2021.

- MP noted it will "continue refining the rate design options with further feedback and analysis,"[25] which means the three options are not proposals but reflect a highly

rates."

[25] Compliance report, at 33-34.

sophisticated work-in-progress, and MP expects to continue working with stakeholders on further refinements.

- To date, there has been no stakeholder consensus on alternative rate design, and MP has not yet indicated whether it prefers Option 1, 2, or 3. The Commission could weigh in on whether a future TOD Tariff filing should contain a single TOD option that is the outcome of further stakeholder involvement, or a suite of possible TOD offerings, with MP's preferred option, that parties could comment on and the Commission could select.

If the time is not yet right for a new docket to be opened, it would seem that a logical next step may include some form of: (a) continued refinement of the three TOD rate options; (b) ongoing stakeholder input in accordance with this refinement; and (c) reporting the outcomes in an informational filing at a later date. Since MP is required to file its second TOD pilot report by August 2020 anyway, this could be a candidate date for filing a report on alternative rate design—in other words, the divided tracks could again be merged.

However, perhaps there is more activity on alternative rate design than staff is currently aware of. For example, it was interesting that MP brought up in their compliance report piloting the rate to EV owners,[26] since to staff's knowledge, EVs have not been discussed in this docket with much depth, if at all. It's possible that MP might have additional ideas about incorporating what it developed with Navigant Consulting that it hasn't yet revealed, and maybe alternative rate design could be planned for a slightly different purpose and for a more limited scope than the pilot initially envisioned. This might be justification for keeping the process bifurcated and for requiring MP to file a new alternative rate design report sooner than August 2020.

For the time being, one thing for the Commission to keep in mind is that the three new TOD rate options could not, at present, practicably substitute for the current TOD rate offered in the pilot program. A main reason is the lack of infrastructure. As MP explained, "each meter is manually programmed to recognize the appropriate bucketing of usage relative to the TOD Rate."[27] It could be labor-intensive and impractical to switch out the meters at this time when MP is not even sure yet which TOD rate is best. Therefore, while it seems to be generally understood that a new rate will likely replace the pilot rate eventually, in the meantime the pilot rate will remain as is.

[26] Compliance report, at 30.

[27] Compliance report, at 6.

VI. Decision Options

1. Accept MP's February 20, 2019 compliance report as complete.

2. Direct MP to continue the TOD rate stakeholder process and require MP to include in its next annual informational report an update of its alternative rate designs.

3. Require MP to include in its next annual informational report a phased timeline for TOD rate rollout, as well as the Company's preliminary recommendation for one or more preferred TOD rate option(s).

4. Delegate authority to the Executive Secretary to modify reporting deadlines if necessary.